typical for this class of readers, it might be quite different in the case of the ordinary teachers of agriculture, for the language of psychology is somewhat strange to the uninitiated. The chapter is worth careful perusal even at the cost of some mental effort.

The chapter on the organization of the course is a disappointment in that it seems only to plan for an elementary course continuing through but a single year, and makes no attempt either to evaluate the subdivisions of agricultural subject-matter with reference to the different years of the curriculum or to suggest how best to utilize the well-established sciences of the earlier and later years. These are important considerations, for not less than two hundred and fifty public high schools in 1911-12 have agriculture taught in two or more years, not to mention fifty or more special schools. It is only just to state that the number of high schools with the more extensive courses was only about sixty when the manuscript was completed—so rapidly is the movement growing.

The chapters on aims and methods of presentation, the organization of the laboratory and field work, and that containing an illustrative list of classified exercises, are full of practical suggestions regarding the technique of instruction. The twenty-nine illustrations, arranged on seventeen plates, are well executed and chosen with discrimination, being better calculated to give an idea of real student activities than is often the case in agricultural publications. The index, consisting of twelve pages, is especially complete. One wonders why the publishers did not group the thirteen or more pages of ten-point references at the end of each chapter or in the appendix, instead of cluttering up the pages with them to the distraction of the reader, even though they do add an air of profundity to the page. They are useful only to the investigator.

Fundamentals of Agriculture. Edited by JAMES EDWARD HALLIGAN. Boston: D. C. Heath & Co., 1911. Pp. iv+492. $1.20.

The encyclopedic flavor of several agricultural texts has drawn forth criticism from many quarters. This book outdoes its competitors in this respect. As a reference book for schools unable to acquire even a small departmental library it should prove of distinct value. Many of the twenty-eight collaborators are well known outside the circle of workers in their special fields and are authors of standard works.

While the chapter headings are conventional, a list of the seventy-eight subdivisions would show the wide range of topics treated, in most cases quite intensively. One such, "The Injury of Gas and Electricity to Trees," is as unusual as is the English of its title. The book is quite free from one fault pointed out in some agricultural texts, namely, that they leave out agriculture—the raising of crops and the care of animals. The illustrations often suffer from poor execution and are sometimes rather pointless.

Though possessing distinct merit as a reference book, the claim that the work is adapted for use as a textbook is open to question and deserves more than passing note, especially so since the study of agriculture is increasing so rapidly and since its methods of instruction show such improvement. The marked unevenness of treatment is incidental to the number of contributors. The discussion of bees is briefer and more simple than that given in certain well-known nature-study handbooks. Other topics clearly should not be attempted below the eleventh or twelfth grade. An example of avoidable duplication is found in the fact that the same amount

of space is given to nitrifying bacteria in two chapters by different authors without a justifying difference of point of view.

Although only a small part of the book could be covered in one year if accompanied by the desirable amount of experimental work, no divisions indicate an intention to adapt the book progressively to different years, or to take account of the presence in the curriculum of the well-established sciences. The chapter on plant life attempts the rather dubious task of compressing into twenty-nine pages a survey of all botany, both physiological and morphological, from protophytes up. Two pages are given to flower structure and six to plant-breeding. Incidentally the terms "fertilization" and "pollination" seem to be used interchangeably. On one page the ovules are said to be fertilized; on the next it is the pistil that is fertilized. Surely if the student has had no botany before he needs more than is here provided, while if he has had a good course in the subject valuable space is wasted in presenting such a fragmentary treatment. In the generally excellent treatment of economic insects, from the standpoint of high-school use, the brief introduction seems to assume no previous zoölogy. The student should get somewhere a better conception of the zoölogical setting of insects, and of other groups as well, than is afforded in this book. On the other hand, the chapter on manures and fertilizing materials frankly presupposes some chemistry, a subject occurring in the curriculum later, usually, than botany or zoölogy. The same may be said of other material furnished by the editor.

The strong tendencies in secondary-school agriculture point to the need of a book or series departing more radically than does this from conventional lines. Pedagogical treatment should be held to be equal in importance with the facts stated.

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UPPER MONTCLAIR, N.J.

Elementary Modern Chemistry. By WILHELM OSTWALD and HARRY W. MORSE. Boston: Ginn & Co., 1909. Pp. xi+291. $1.00.

In their preface, the authors of this compact little book state that they have planned to present a sufficient number of facts and experiments to fill the time usually devoted to a first course, and at the same time have endeavored to fit these facts, as far as possible, to the simpler of the general laws now firmly established as the basis of the science of chemistry. Among the selected facts and experiments themselves one cannot expect to find any great divergence from the practice of many modern school texts. There are many simple diagrams, and these, in the main, are excellent; one exception, however, is that on p. 158, which shows a remarkably clear nitrate ring instead of a disc.

As might be anticipated, any abnormality that this book exhibits is on the side of theory and philosophical presentation of the facts. "A body which is studied with reference to its specific properties is called a substance" (p. 2). "Any solid whatever can be changed into a liquid if its temperature is raised to a high enough point" (p. 6). "A chemical reaction takes place more rapidly the higher the temperature" (p. 20). "Aluminium has all the properties common to metals except weight" (p. 27). These and other statements occurring later indicate that, to be used successfully, this book must be in the hands of a good teacher. But the errors are few, and the book is well produced. It may certainly be said that there are many books in the field which this one could with advantage displace.